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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/220,153	12/23/1998	PETER REIMER	2981/USA/SMO	3858

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APPLIED MATERIALS, INC.
2881 SCOTT BLVD. M/S 2061
SANTA CLARA, CA 95050

EXAMINER

BUEKER, RICHARD R

ART UNIT PAPER NUMBER

1763

DATE MAILED: 11/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/220,153

Applicant(s)

REIMER ET AL.

Examiner

Richard Bueker

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 June 2003.
- 2a) ☐ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-107 is/are pending in the application.
- 4a) Of the above claim(s) 31-37 and 76-83 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-9, 11, 12, 14-20, 23-27, 29, 38-41, 43, 44, 46-49, 51, 52, 54-58, 60, 61, 63-75 and 84-107 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 10, 13, 21, 22, 28, 30, 42, 45, 50, 53, 59 and 62 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5, 16, 18 + 20 6) ☐ Other: _____

Art Unit: 1763

Claim 107 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 107 recites a pump operating rotational speed of "not more than 12,000 rpm", while applicants' specification at page 3, last line recites "an operating rotational speed of less than 10,000 revolutions per minute". Therefore, the claimed range is new matter.

Claims 41 and 93 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 41, the phrase "the inlet stages" is vague and indefinite because it lacks proper antecedent basis. In claim 93, the phrase "comprises a length of less than 2 m" is unclear because claim 93 depends from claim 92, which requires a foreline length of at least 3 meters, and also the "comprising" language does not appear to limit the length of the foreline to less than 2 meters.

Claim 93 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The "comprising" language does not appear to limit the length of the foreline to less than 2 meters, or to require any difference from that recited in claim 92.

Art Unit: 1763

The following typos should be corrected: in claim 103, line 2, "and" should be changed to "an"; in claim 106, "are" should be "area".

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The information disclosure statement provided by applicants on July 25, 2002 (paper no. 20), and supplemental information provided on Oct. 7, 2002 (paper no. 22) and June 30, 2003 (paper no. 25) which described the sale of a semiconductor processing tool which including a pump has been considered, but has not been used as the basis of a rejection because the IDS filed June 30, 2003 stated that the on-sale activity did not occur in this country.

Claims 1, 6, 8 and 16 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Olson (5,709,753). Olson (see Figs. 3 and 6, col. 9, lines 21-45 and col. 10, lines 21-23) discloses a process chamber that is evacuated by a vacuum pump that is located close to the process chamber. The vacuum pump is a low vacuum pump that discharges to atmospheric pressure. Since the definition of "adjacent" is "not distant", the vacuum pump of Olson is inherently located adjacent to the process chamber. Regarding the recitation of a "high capacity" pump, it is noted that this is a relative term and Olson's pump is inherently a high capacity pump in comparison to a smaller, lower capacity pump.

Claims 2-3, 19-20, 92-95 and 97-100 are rejected under 35 U.S.C. 103(a) as being unpatentable over Olson. The particular pipe sizes recited in these claims are prima facie obvious in view of Olson, who illustrates the location of his pump as being close to the process chamber.

Claims 1, 6, 8, 9, 14, 16 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ackley (4,534,314). Ackley (see Figs. 1 and 8-12, col. 1, lines 58-61, and col. 3, lines 15-18) discloses an apparatus for containing and/or processing a substrate including a roughing pump connected to a vacuum chamber to pump the vacuum chamber down from atmospheric pressure. The various ancillary vacuum pumps are all housed compactly in cabinet 26 and thus are inherently adjacent the vacuum chamber. Regarding the recitation of a "high capacity" pump, it is noted that this is a relative term and Ackley's pump is inherently a high capacity pump in comparison to a smaller, lower capacity pump.

Claims 2-3, 11, 12 19-20, 92-95 and 97-100 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ackley (4,534,314). The particular pipe sizes recited in these claims are prima facie obvious in view of Ackley, who illustrates the location of his pump as being close to the process chamber.

Claims 1-3, 6-9, 11-12, 14-16, 19, 20, 23-27, 29, 65-71, 73, 75, 84-90, and 92-107 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kagaso (JP 04-358531). Kagaso (Fig. 1) discloses an apparatus for processing a substrate comprising a variable speed vacuum pump connected to a loadlock chamber. A controller is programmed to control a variable speed motor to change the speed of the pump. The controller causes the pump motor to initially rotate slowly, and then to increase its rotation speed as the vacuum increases in the chamber, for the purpose of rapidly evacuating the chamber while preventing dust particles in the chamber from being swirled about the chamber by excessive gas currents (page 8, lines 11-23 of the translation). Kagaso's pump exhausts to atmospheric pressure (page 6, lines 9-16 of the translation). At page 10, lines 19-23 of the translation, Kagaso teaches the use of a 2-meter foreline having a diameter of 50 mm. Kagaso does not specifically describe his vacuum pump as a "high capacity pump" or as being "adjacent" to the vacuum chamber, but his pump can be considered to be inherently "adjacent" the vacuum chamber, because the dictionary definition of "adjacent" is "not distant" or nearby". Also, Kagaso's pump is used for the same purpose as applicants' pump, and it can be considered to inherently be a high capacity pump. The internal surface area of a foreline of that size is approximately 0.31 m²,

meeting the limitation of claim 97, for example. Regarding the claim 65 limitation of controlling the rates of evacuation of the gas to reduce the condensation of moisture, it is noted that Kagaso's pump speed increases with time in the same manner as applicants' pump speed, and Kagaso's pump would inherently cause a reduction in condensation to some extent, compared to a pump with a constant pump speed. Also, the claim 67 recitation "to closely approximate a portion of a condensation curve of pressure versus time" does not significantly limit the claim because of the reference to only a portion of the curve. Also, since Kagaso's pump speed increases with time in the same manner as applicants' pump speed, the shape of the pressure versus time curve of Kagaso would closely approximate the shape of applicants' curve. Regarding claims 16 and 104, for example, Kagaso teaches (page 10, lines 14-16 of the translation) that his variable speed pump can be used to evacuate a vacuum reactor itself. The vacuum reactor of Kagaso can be a film forming process chamber (page 4, lines 1-3 of the translation), which inherently or at least obviously requires a gas distributor. Regarding claim 107, since Kagaso's pump operates from a standing start, its operating rotational speed inherently includes a speed of less than 12,000 rpm, which is what the language of claim 107 requires.

Claims 16, 19, 20, 23 and 104 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kagaso (04-358531) taken in view of Hanakada (JP 02-184333). Kagaso does not specifically state that his loadlock chamber includes a gas distributor as recited in claim 16. Hanakada (Fig. 1, elements 10 and 11), however, teaches that it is desirable to provide a gas distributor in a loadlock chamber for providing inert gas to

raise the pressure of the chamber to atmospheric pressure. It would have been obvious to provide a gas distributor in the loadlock chamber of Kagaso for the reasons taught by Hanakada.

Claims 17, 18 and 104 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kagaso (04-358531) taken in view of Hanakada (JP 02-184333) as stated in the previous paragraph, taken in further view of Suzuki (6,080,679) and Sato (JP 07-167053). Suzuki (see Figs. 9 and 16, col. 1, lines 25-64 and col. 9, line 41 to col. 10, line 19) and Sato (Figs. 2 and 3) teaches the use of a low vacuum skimming pump (roughing pump) connected to a loadlock chamber with a high vacuum pump interposed between the loadlock and low vacuum pump. It would have been obvious to use the variable speed roughing pump of Kagaso as the roughing pump of Sato's apparatus to gain the benefits taught by Kagaso.

Claims 16-20, 23 and 104 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kagaso (04-358531) taken in view of Suzuki (6,080,679) or Sato (JP 07-167053). Kagaso (page 10, lines 14-16 of the translation) teaches that his variable speed pump can be used to evacuate a vacuum reactor itself. Suzuki (see Figs. 9 and 16, col. 1, lines 25-64 and col. 9, line 41 to col. 10, line 19) and Sato (Figs. 2 and 3) teach the use of a roughing pump connected to a process chamber. It would have been obvious to one skilled in the art to utilize a variable speed pump of Kagaso as the roughing pump connected to the process chamber of Sato, to gain the benefits of a variable speed pump as taught by Kagaso.

Claims 72, 74, 91 and 107 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kagaso (04-358531) taken in view of Beyer (5,944,049). Kagaso uses a pre-programmed controller to vary the speed of his pump. Beyer, however, teaches that the vacuum pressure in a chamber can be accurately controlled by connecting the controller to a chamber pressure gauge to provide feedback control of the pump speed. It would have been obvious to modify the pump of Kagaso to control the pump speed by feedback control using a chamber pressure sensor, because Beyer teaches that this works well to control vacuum chamber pressure to a desired level. Also, Kagaso does not discuss the operating speed of his roughing pump, but Beyer (col. 4, lines 12-22) teaches that roughing pumps are known to operate in the RPM range recited in claims 74 and 107.

Claims 92-95 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Arami (5,575,853). Arami's apparatus includes a dry pump which is connected to the vacuum chamber and exhausts to atmospheric pressure, and the fore line of the dry pump is 40 mm in diameter, which means that a three meter length has an internal diameter of less than 0.4 m^2 as recited in claim 92. Regarding claim 93, it is noted that the phrase "comprises a length of less than 2 m" does not appear to limit the length of the foreline to less than 2 meters because of the "comprising" language.

Claim 96 and 105 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arami (5,575,853) taken in view of Beyer (5,944,049) and Kagaso. It would have been obvious to use a variable speed pump for the backing pump of Arami, because

Art Unit: 1763

Beyer teaches the use of a variable speed pre-vacuum pump for more accurate pressure control, and Kagaso teaches the use of a variable speed roughing pump for better control of the initial evacuation of a vacuum chamber.

Claims 1, 6-8, 16-18, 23-27, 38, 40, 43, 46, 47, 48, 51, 54, 55, 102 and 104 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Beyer (5,944,049). Regarding claim 1, Beyer discloses a pump (Fig. 14) that exhausts to atmospheric pressure, that inherently is a high capacity pump, and can inherently be considered to be adjacent the vacuum chamber, because "adjacent" is defined as "not distant" or "nearby". Regarding claims 6 and 27, for example, Beyer's Fig. 12 embodiment includes a pre-vacuum pump that changes rotational speed in response to a signal from a pressure controller. Regarding claim 38, the embodiments of Figs. 8 and 10-14 of Beyer disclose a pump having a plurality of inlet ports, with a first inlet port to evacuate gas from a first chamber, and a second inlet port for receiving injection gas supplied from valve 33. Claim 38 recites only a pump having plural inlet ports, with the second chamber referred to in claim 38 being a recitation of intended use. The second inlet port of the pump of Figs. 8 and 10-14 has an inherent capability of being connected to a second chamber according to the intended use recited in claim 38. Regarding claim 43, Beyer's Fig. 14 embodiment includes plural inlet ports, and also exhausts to atmospheric pressure. Regarding claim 46, for example, Beyer's Fig. 14 pump includes a low vacuum stage and therefore can be considered to inherently comprise a pre-vacuum pump or a low vacuum pump.

Claims 38-41, 46, 48, 49, 54, 56, 58, 63 and 64 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Conrad (5,733,104). Conrad (Fig. 2 and col. 5, lines 21-66) discloses a pump having plural stages installed on a common drive shaft, and each stage has its own inlet. A plurality of chambers are evacuated by connecting each chamber to a respective stage inlet. Regarding claim 38, it is noted that this claim recites a pump only, and the reference to chambers and to processing a substrate are recitations of intended use. The pump of Conrad has an inherent capability of being used for other purposes, including in an apparatus for processing a substrate. Regarding claim 56, the recitation of "chambers that are shaped and sized to hold one or more substrates" does not require the chambers to actually be adapted to support a substrate within a chamber. Also, this phrase does not include any limitation or requirement on the type or size of substrate that the chambers are capable of holding. Therefore, the vacuum chambers of Conrad inherently meet this limitation because they are inherently capable of holding a substrate of at least some limited size.

Claims 44, 52, 57, 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conrad (5,733,104) taken in view of Kagaso (JP 04-358531) and Arami (5,575,853). Conrad does not discuss the distance between his pump and vacuum chambers. Kagaso and Arami, however, both teach that vacuum pumps can be located within 2 meters of a process chamber, and that it is desirable to do so. It would have been obvious to one skilled in the art to locate the pumping unit of Conrad

Art Unit: 1763

within a short distance of the vacuum chambers to make the apparatus more compact as taught by Kagaso and Arami.

Claims 43, 51 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conrad (5,733,104) taken in view of Beyer (5,944,049). Conrad's plural stage pump does not exhaust to atmospheric pressure as recited in claim 43, and Conrad uses a dry pump to back his plural stage pump. Beyer, however, teaches (see Fig. 14 and col. 11, lines 19-30) that a plural stage pump can be provided with several pumping or compression stages to form a high compression pump that is compact and will pump to atmospheric pressure. It would have been obvious to modify the plural stage pump of Conrad by providing it with the atmospheric pressure compression stages taught by Beyer to make it desirably more compact.

The Declaration of Pedram Sabouri filed on March 12, 2002 has been considered but is not convincing. The Declaration argues that the pump of Olson is not a high capacity pump because it would take 3 minutes to pump down a loadlock chamber to 100 mTorr, assuming the loadlock chamber was 30 liters. It is noted, however, that the assumption of a 30-liter loadlock is not commensurate with the scope of the present claims, which do not recite a particular chamber size or pump capacity. It is noted that the phrase "high capacity" is a relative term and there are pumps with lower pumping capacity than Olson's pump. Regarding the product literature for the Drytel pump provided by applicants, it is noted that the Drytel model 100 has a pumping capacity of 1620 liters/min. which is a high capacity compared to the Drytel 34, which has a pumping capacity of 450 liters/min.

Art Unit: 1763

Claims 4, 5, 10, 13, 21, 22, 28, 30, 42, 45, 50, 53, 59 and 62 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (703) 308-1895. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Richard Bueker

Richard Bueker
Primary Examiner
Art Unit 1763